Patent
Docket No: 55347US003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Group Art Unit: 1714

Ashish K. Khandpur, Jingjing Ma, Mark D. Gehlsen, Bradley S. Momchilovich, and John J. Stradinger

Serial No.: 09/496,831
Filed: February 2, 2000 Examiner: P Szekely

For: Adhesive for Bonding to Low Surface Energy Surfaces

CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 C.F.R. 1.8: I hereby certify that this correspondence is being sent by facsimile to the telephone number shown below, addressed to the Commissioner for Patents, Washington, D.C. 20231, on the below indicated date:

Facsimile Number: **703-872-9311**

Date: _____ By_____
Louise M. Guggisberg

DECLARATION UNDER 37 C.F.R. §132 OF ASHISH KHANDPUR

Commissioner for Patents
Washington, DC 20231
Box AF

JAL

I, Ashish Khandpur, hereby declare that:

1. I am the same Ashish Khandpur who is identified as a co-inventor in the above-identified application ("our application").

2. I received a Bachelor of Technology degree in Chemical Engineering from the Indian Institute of Technology in New Delhi, India in 1989 and a Ph.D. degree in Chemical Engineering from the University of Minnesota in 1995.

3. From 1995 to the present I have been employed by Minnesota Mining and Manufacturing Company (3M) in St. Paul, Minnesota, in the Adhesive Technologies Center, where I currently supervise work involving tapes and tape backings. My current title is Technical Manager.

4. I am an inventor or co-inventor of 2 issued U. S. patents, 2 allowed U.S. applications and 4 other pending U.S. patent applications involving adhesives and adhesive products.

5. I have read the Final Rejection mailed May 6, 2002, cited U.S. Patent Nos. 5,393,787 ('787 Patent) and 5,773,506 ('506 Patent) and our application. Our application describes adhesives having particularly good bond strength on low surface energy surfaces. The adhesives contain a polymodal asymmetric elastomeric block copolymer and at least one tackifier or tackifying resin. The tackifier or tackifying resin is present in an amount sufficient to raise the calculated Fox Tg of the adhesive's rubber phase to greater than 245°K. A 5 mil thick film of the adhesive can exhibit a 180° peel strength (at the 30.5 cm/min peel rate employed in our application, see page 17, lines 26-31) on high density polyethylene ("HDPE") of at least about 60 N/dm. The peel strength measurements set out below were also obtained at a peel rate of 30.5 cm/min.

6. The adhesives of the '787 Patent and the adhesives of our application are not the same. The '787 Patent exemplifies 5 block copolymers, three of which (Polymer A, Polymer B and Polymer C, see Table 2) are asymmetric. These were made into adhesives as shown in Table 3 of the '787 Patent. I used the Fox equation $1/T_g = w_e/T_{g,e} - w_s/T_{g,s} + w_l/T_{g,l}$ (wherein $T_{g,e}$, $T_{g,s}$, and $T_{g,l}$ represent the glass transition temperature of the rubber, solid tackifier, and liquid tackifier, respectively, and w_e, w_s, and w_l represent the weight fractions of the rubber, solid tackifier, and liquid tackifier, respectively, in the rubbery phase of the adhesive) to calculate the resulting rubber phase Fox Tg of these adhesives. I assumed that all the added tackifiers serve to tackify the rubber phase (polyisoprene in this case) of the copolymer. I note that reported Tg values are not always in exact agreement. For example, the '506 Patent used a Tg of 213°K for polyisoprene (see col. 12, lines 41-44 of the '506 Patent), whereas our application used a Tg of 215°K (see page 19, line 27). If I assume the higher of these two values for polyisoprene and assume that the Tg values for WINGTACK™ PLUS tackifier resin and ZONAREZ™ A-25 plasticizer are 315°K and 253°K, respectively, then the adhesives made from Polymer A, Polymer B and Polymer C in the '787 Patent had calculated rubber phase Fox Tg values of 240.2°K, 240.2°K and 240.5°K, respectively. These rubber phase Fox Tg values are not "greater than 245°K".

7. To further illustrate the differences between our application and the '787 Patent, my colleague and coinventor Dr. Jingjing Ma recently provided to me a sample of

the polymodal asymmetric elastomeric block copolymer (the "Base Copolymer") employed in the examples and comparative examples in our application (see page 20, lines 1-13). Our colleague and coinventor John J. Stradinger (a technologist who works with me) formulated the Base Copolymer into an adhesive. At my request Mr. Stradinger mixed 100 parts of the copolymer with 46.2 parts ESCOREZ 1310 and 53.8 parts ZONAREZ A-25 in toluene to provide a 20% solids solution. Using the Fox equation and the Tg values employed in our application (*viz.*, Tg values for polyisoprene, ESCOREZ™ 1310 and ZONAREZ™ A-25 of 215°K, 313.5°K and 251°K, respectively), this adhesive had a rubber phase calculated Fox Tg of 243.3°K. Using the Tg values employed in the '506 patent (viz., Tg values for polyisoprene, ESCOREZ 1310, and ZONAREZ A-25 of 213°K, 318°K, and 253°K, respectively), a calculated rubber phase Fox Tg of 243.3°K is again obtained for this adhesive. This is a higher rubber phase Fox Tg than was employed in the adhesives exemplified in the '787 Patent, and is not an adhesive shown or suggested in the '787 Patent. It is merely being discussed here to address a request from Examiner Michl for comparative data for an adhesive like that of the '787 Patent but having a Tg near 245°K. At my request (and using substantially the procedure described in our application at page 17, lines 16-31), Mr. Stradinger coated a 5 mil thick layer of the adhesive on a 1.4 mil thick polyethylene terephthalate backing and evaluated the adhesive's 180° peel strength on glass, polypropylene and HDPE. Mr. Stradinger obtained bond strengths on these substrates of 56.7, 87.1 and 50.1 N/dm, respectively.

8. The adhesives of the '506 Patent and the adhesives of our application are not the same. The '506 Patent exemplifies six block copolymers, one of which (Polymer F) is asymmetric. As shown in Table 6 of the '506 Patent, Polymer F was made into Adhesive 11 and Adhesive 12. Col. 12, lines 36-39 of the '506 Patent says that Adhesive 11 and Adhesive 12 "had an estimated glass transition temperature of about 245° K for the tackified polyisoprene fraction of the adhesive as predicted by the Fox equation". I recalculated these rubber phase Fox Tg values to higher precision. Using the Tg values reported in the '506 Patent (*viz.*, Tg values for polyisoprene, ESCOREZ™ 1310, ESCOREZ™ 2393, ZONAREZ™ A-25 and PICCOVAR™ AP-25 of 213°K, 318°K, 318°K, 253°K and 253°K, respectively), I obtained a recalculated rubber phase Fox Tg of 243.2°K. This rubber phase Fox Tg value is not "greater than 245°K".

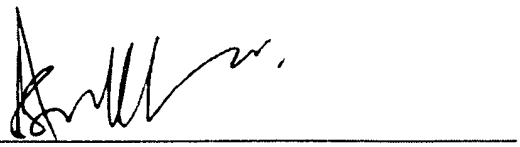
9. To further illustrate the differences between our application and the '506 Patent, Dr. Ma recently gave me a sample copolymer ("Substitute Polymer F") for formulation into an adhesive. As explained in Dr. Ma's Declaration, Substitute Polymer F is substantially similar to Polymer F and was used in place of Polymer F because Dr. Ma's supply of Polymer F had been used up or discarded. At my request, Mr. Stradinger formulated an adhesive by mixing 100 parts of Substitute Polymer F with 46.2 parts ESCOREZ 1310 and 53.8 parts ZONAREZ A-25 in toluene to provide a 20% solids solution. Using the Fox equation and the Tg values employed in our application (*viz.*, Tg values for polyisoprene, ESCOREZ™ 1310 and ZONAREZ™ A-25 of 215°K, 313.5°K and 251°K, respectively), this adhesive had a rubber phase calculated Fox Tg of 243.3°K. Mr. Stradinger coated a 5 mil thick layer of the adhesive on a 1.4 mil thick polyethylene terephthalate backing and evaluated the adhesive's 180° peel strength on glass, polypropylene and HDPE. Mr. Stradinger obtained bond strengths on these substrates of 42.7, 63.0 and 30.2 N/dm, respectively.

10. The above-described experimental results show that the adhesives of our application provide better 180° peel strength on HDPE (*viz.*, at least about 60 N/dm) than an adhesive based on a copolymer like one shown in the '787 Patent or an adhesive based on a copolymer like one shown in the '506 Patent when such copolymers are combined with sufficient tackifier to raise the calculated rubber phase Fox Tg of the resulting adhesives to 243.3°K.

11. All statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the Application or any patent issuing thereon.

Further Declarant saith not.

08/08/2002
Date



Ashish Khandpur